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CONSUMER PANEL RESEARCH OF GfK

HANS-GEORG PRESTER

Preliminary Remarks

There is still reluctance of commercial market research and scientific research to deal with each other. A black and white view on this topic shows the following outlines:

On the one hand it is doubted that a profit oriented institute is always willing and able to fulfill the standards of scientific research. Focus on the price of research and the informational interests of the clients are seen as possible dangers which may reduce quality of research. Sometimes the commercial institutes contribute to this view, when they hide the details of their research. But the reasons for this covering are often that a) the clients want to be better informed than their competitors and b) the institutes want to secure their commercial success by protecting themselves against copies of their research instruments.

On the other hand you can hear complains about scientific research: it were slow, hair-splitting and would not help to provide solutions for the challenges of business. Besides the difficulties to get resources for scientific research, probably the rules of academic career („publish or perish“) are the breeding ground of these complains. Publications about research with complex multivariate methods in established academic fields help academic career, but this is seldom compatible with research about specific business problems.

All the better that despite these obstacles ZUMA and GfK have begun to cooperate. ZUMA has shown interest for the data coming from consumer panel research and GfK has delivered panel data. The following notes will therefore give an impression about GfK, consumer panel research, and the panel data.

1. Who is GfK?

The GfK group (Gesellschaft für Konsumforschung) was established in 1934. In universities, business associations and industry a view disseminated, which Wilhelm Vershofen, one of the founders of GfK formulated as follows: „In present days the insight is more and more accepted, that the consumer – in the sense of the end buyer - is the economic

factor of prime importance. His attitudes, his habits and his purchasing decisions determine the success of all products which are produced for the market, i.e. for sale.“ Consumer panel data help branded goods manufacturers and retailers to understand consumers' product preferences, attitudes and behavior patterns, and to tailor their goods and services to changing consumer behavior.

In the beginning of GfK secondary statistics (e.g. maps about regional differences in the spending power of consumers) and consumer, retailers and manufacturer surveys about consumption played the key role. The date of birth of a real consumer panel was 1957 (1000 households). This panel was continuously increased in the following years and later complemented by an individual panel..

Today the GfK Group includes 14 German subsidiaries and in addition 90 subsidiaries located in 43 countries worldwide. It's core business is the collection, analysis and interpretation of trading and consumer information on behalf of brand manufacturers, retailers and services companies and the media. With total revenues of DM 760 millions (1999) the GfK Group worldwide is one of the leading companies in a market research market of some DM 30 billion. These revenues were achieved with about 4,100 staff in 4 business divisions:

- Consumer Tracking (consumer panel research and mail panel)
- Non-Food Tracking (retail audits for consumer technology products – principally in the IT, telecommunications, consumer electronics, household goods, photographic and Do it Yourself products sectors)
- Media (TV audience ratings, quantitative and qualitative data on the use of other electronic and print media)
- Ad Hoc Research (information services about different stages of the marketing decision making process, e.g. product test, advertising pre-tests, monitoring of the use of advertising media, test market simulation etc.)

In 1999 the most outstanding event for GfK was it's flotation. Since September 23, GfK has been quoted on the Frankfurt Stock Exchange. Since March 2000 GfK is a member of the M-Dax.

2. What is Consumer Panel Research?

2.1 The Methods of Consumer Panel Research

In consumer panel research data about purchasing behavior are continuously collected with the same instrument from the same consumers (for an overview about market research with panels see: Günther et al., 1998)

The sample may be *households* (household panel) or *individuals* (individual panel). Ideally always the same consumers should be in the sample, but in reality people finish their participation after a while (panel mortality) and have to be replaced in the sample. In an established and well managed consumer panel continuous reporting over a whole year of about 70% to 80% of the sample can be achieved.

The collected data concern the *purchases of the consumers* in certain product fields. Usually data about so called FMCG (fast moving consumer goods, like food, beverages, products for washing and cleaning etc.) but also about the purchase of durables and services (e.g. lending of videos, visits to the cinema) are collected. The main informations captured, are the date of the purchase, the shop, the identification of the item purchased, the amount bought, and the price paid. A household panel is the most economic type of sample, because one person in the household (usually the housekeeping person) has the task to report the purchases of all members of the household. In practice this works well as long as items are concerned, which where bought by the housekeeping person itself or which she uses. A broad product area of items necessary for housekeeping (e.g. washing, cleaning and cooking) can be covered with this method. But for products which are mostly individually bought and consumed, an individual panel delivers more reliable data. In GfK Germany data about articles for personal care and confectionery are therefore collected in a sample of individuals. In the meantime the individual panel is a combination of a household sample and an individuals sample, where the purchases of housekeeping persons are taken from an individualised household sample and the purchases of non-housekeeping persons are taken from an individual sample.

In addition to the purchase data, *sociodemographic* informations are collected, e.g. size of the household, region, age of the housewife etc. It is also possible to measure consumption relevant *attitudes* under certain restrictions. These restrictions are, that the work load on the panel members must not exceed certain limits and that questions have to be avoided which influence the purchasing behavior. Informations which allow for the identification of panel members cannot be used in reporting and analysis, but of course name and adress are necessary for the administration of the panels, and their processing follows the regulations of the data processing act.

In consumer panel research the traditional *method of data collection* is the *paper & pencil diary* with prepared sheets for household's input. Usually the panel members get the diary for a quarter of a year in advance, and send back the sheets weekly (or monthly) in a stamped addressed envelope. For this purpose the sheets in the diary are organized by weeks (or months), so that for all weeks (months) the same set of forms is contained in the diary. In all cases the day of the purchase is registered and the panel members are instructed to enter their items at the same day they purchased them.

A special challenge of this method is the precise identification of the article bought. The panel members therefore had to write down brand name, manufacturer, packsize and other features of an article, but in the mean time the collection of the EAN number, which is printed as a *barcode* on most packages, is preferred whenever possible. Because the EAN is just a numbering of products and not a code system for article features, the institute has to administrate an EAN master file, which contains the translation of the numbers in product features and their values. This has to be done by the institute itself because at the moment there is no general EAN master file which specifies product descriptions in a depth required for market research.

In the paper & pencil method the EAN number is written down (it is always printed below the barcode), but the possibility to capture barcodes electronically led to a revolution in consumer panel research by using hand held scanners instead of paper & pencil diaries in the households. During 1997 GfK switched its main household panel to *electronic data collection* (Electronic Diary). Each household got a mobile hand held device which can be used to scan the barcodes and also has a display and a keyboard. These features allow asking questions and offer possibilities to select informations like the shop from an option list. The number of packages bought and the price paid are key entered. Also non bar-coded products can be entered by means of an electronic questionnaire which asks for the product features.

The purchase data entered are stored in the device and automatically transferred to the institute via modem and phone every weekend (free of charge for the panel members).

Electronic data capturing with the present technology of handheld scanners comes to its limits, when products are reported which usually have no EAN number, e.g. fresh food or textiles (too laborious for the panel members if much details are required). Therefore GfK still runs traditional paper & pencil panels for these special product fields.

2.2 Panel Maintenance and Quality Control

The objectives of panel maintenance in an established panel are to motivate the panel members to stay in the panel and to secure a good quality of reporting. Furthermore those who finished participation have to be replaced.

The consumer panels of GfK Germany are quota samples which are adjusted by weighting according to regions, household size, age, gender, townsizes etc.

When *recruiting* panel members importance is attached to a broad regional variance and the inclusion of random elements into the recruitment procedures. A recruitment mix of interviewers (quota by region x age and region x household size), mailings and CATI (random addresses / phone numbers stratified by regions and townsizes) is used. It must not be forgotten that it is much more difficult to recruit panel members for continuous reporting than respondents for a single shot survey.

To motivate panel members a mix of *incentives* is used. They get brochures and news letters several times a year, which show them on a generalized level what GfK does with the data they reported, birthday cards, and can choose a gift of about 70.- DM after one year of regular reporting. Furthermore there are prize draws every quarter containing a car (VW Golf), dream holidays for two persons including a generous pocket money, two day trips to Nürnberg including a visit to GfK, and gifts of money. A special role plays the telephone hotline who is not only available for questions of the panel members but also actively calls them when quality problems in reporting are recognized.

Quality control of the panels is done on two levels. On the one hand the quality of reporting is tracked continuously and bad reporters are given their notice to leave the panel, on the other each single purchase reported has to be controlled for plausibility.

To control the *reporting quality of panel members*, only respondents who fulfill certain requirements are included in the part of the total sample used for reporting. At the end of each month the response behavior is controlled whether data were delivered at all and whether the amount purchased in total is in a plausible range around the mean of all households of same size. Only panel members fulfilling these criteria are included in the reporting mass of the passed month. Regularly the panel members are checked for their long term response rates, if necessary they get a notice to leave the panel.

This system of monthly selecting the good responders as the base for the reports (monthly mass) has consequences for the analyses. For facts like volume, value and market shares the monthly masses can be added (full mass), but for facts where the buying history is important (e.g. penetration) only those panel members which reported continuously during all interesting periods (continuous mass) are the basis of the analysis. The

continuous reporters are therefore the most valuable part of a consumer panel, because they allow for dynamic analyses of purchasing behavior like brand switching etc.

In *controlling the single purchase acts* the intention is to recognize errors which the panel members made when entering the purchase. Most of these errors are careless mistakes when entering prices (e.g. DM 1.08 instead of DM 10.80), but these deviations can be recognized by automatic check procedures (comparison with the average price of the article) and corrected to a plausible value.

2.3 Consumer Panels offered by GfK

In 1999 GfK Germany offered the following main consumer panels for FMCG, which are summarized under the brand name „*ConsumerScan*“.

<i>Panel</i>	<i>Universe</i>	<i>Sample Size</i>	<i>Data Collection</i>	<i>Product Fields</i>
ConsumerScan Households	Private German Households	12.000 households	Electronic	Fast moving consumer goods (food, beverages, washing, cleaning, personal care, pet food, other products for housekeeping)
ConsumerScan Fresh Food	Private german households	5.000 households	Paper & Pencil	Fresh products (vegetables, fruits, meat, fish) Alcoholic beverages
ConsumerScan Individuals	Persons living in private german households age 10 years and older	10.000 individuals	Paper & Pencil	Confectionery, personal care, drugs Communication and services (e.g. magazines, cinema, video, lotteries etc.)

Beside some other special panels, additionally under the brand name „ConsumerScope“ a household panel of 20.000 households is offered for mail surveys. The mailpanel is used for monthly surveys which can be focussed on target groups and for the data collection about the purchases of durables (like household appliances and consumer electronics).

Beginning in 2000 for personal care and confectionary combinations of the purchases of housekeeping persons in the household panel with the purchases of individuals in the individual panel are offered (ConsumerScan Health and Beauty, ConsumerScan Confectionery). The combined samples are individualized and made proportional according to housekeeping (yes/no) and other individual characteristics by weighting procedures.

2.4 The Insights coming from Consumer Panel Research

The previous chapters may have formed an idea of that consumer panels have to be continuously cared for. So it should be no surprise that they are costly instruments. They deliver a *continuous stream of purchasing data* about the same product fields.

The data are sold via long term contracts (e.g. for one year up to three years). This contracts specify the rhythm of report delivery (e.g. monthly, quarterly, etc.), the product fields reported, the facts (e.g. penetration, volume, market share, prices), the extent of consulting (e.g. yearly presentations of the market) and budgets for special analyses with the panel data, not covered by regular reporting.

The *clients* of the consumer panel are the brand manufacturers but also retail companies and associations. The insights from consumer panel data for these clients can be summarized as follows:

- *Market Tracking*: How is my brand developing compared to the market and other brands?
Here especially time series of market shares, the success of innovations and the development of markets are analyzed.
- *Target Groups*: Who purchases my brand?
In which segments are my brands / other brands successful?
- *Brand Health Check*: What are the strengths and weaknesses of my brand compared to other brands?
Compared to competitive brands, benchmarks like the penetration rate, intensity, repeat buying etc. are analysed.

- *Evaluation of Marketing Policy:* What effects have changes in the marketing mix? It is important to learn how changes in the four P's (product, place, price, promotion and people) of marketing mix effect the market share.
- *Category Management:* How can store assortments, product introduction and promotion be optimized? The behavior of the customers is analysed to define categories, evaluate their performance and make recommendations about optimal store assortments.
- *Forecast:* Which benchmarks will a product introduction achieve? The question for each manufacturer who launches a new product in the market is, whether his product will achieve a market share necessary for commercial success. Consumer panel data help to forecast whether the product will be a success or a flop by analyzing the consumer reactions in the phase of the introduction.

These points illustrate that the purchase data themselves are in the centre of interest. The next chapter will show how consumer panel data are used in market research.

3. Methods of Analyzing Consumer Panel Data

3.1 Benchmarks for Market Evaluation derived from Consumer Panel Data

Some characteristics became established in consumer panel research which are in principle tautological decompositions of volume, value or market shares. But the components react differently – this is the practical experience – to marketing decisions.

These characteristics are described in the following section:

Be „X“ a certain product and „Pg“ the product group to which X belongs, furthermore:

N	:= sample size of the panel
Nb(Pg)	:= number of buyers of the product group in the panel
Nb(X)	:= number of buyers of X in the panel
Vol(Pg)	:= volume of the product group bought in the panel
Vol(X)	:= volume of X bought in the panel
Vol(Pg/X)	:= volume of the product group, bought by the purchasers of X

Then it can be derived:

Penetration of X	Pen(X)	:= Nb(X)/N
Relative Penetration of X	Rpen(X)	:= Nb(X)/Nb(Pg)
Market share of X (basis volume)	MSVol(X)	:= Vol(X)/Vol(Pg)
Volume of X per Household	VolpHH(X)	:= Vol(X)/N
Volume of X per Buyer of X	VolpB(X)	:= Vol(X)/Nb(X)
Brand Share amongst Brand Buyer	BSBB(X)	:= Vol(X)/Vol(Pg/X)
Product Group Vol. per X Buyer	VolpB(Pg/X)	:= Vol(Pg/X)/Nb(X)
Intensity Factor of X	Ifactor(X)	:= VolpB(Pg/X)/VolpB(Pg)

Penetration, Relative penetration, Market Share and BSBB are usually reported as percentages. Instead of Volume per household usually Volume per 100 households is reported.

Immediately plausible is the following *basic formula of market decomposition*:

$$\text{VolpHH}(X) = \text{Pen}(X) * \text{VolpB}(X)$$

That means that the volume bought by a product depends on the circle of buyers which can be reached and the intensity of buying. One gets more insights into market dynamics if one tracks and compares the single components because they can be influenced by different policies. A high penetration rate can be achieved by a broad target group, high distribution rate (the optimum is, if one can buy the product in every shop), much advertising to make the product well known, and many promotions (e.g. price promotions). But if the buyers of X are intensive buyers (compared to the buyers of other brands), depends whether loyalty to the product can be induced. E.g. by optimal adaption of the product to the demands of the target group, high quality of the product, good value for money and an attractive product image.

The basic formula can be decomposed further on, by replacing Volume per Buyer with the product of Buying Acts per Buyer times Volume per Buying Act. Instead of Volume also Value or Number of Packages can be taken.

Not so intuitively plausible, but easily to verify by inserting the definitions is the *Parfitt-Collins decomposition of Market Share*:

$$\text{MSVol}(X) = \text{Rpen}(X) * \text{BSBB}(X) * \text{Ifactor}(X)$$

The Relative Penetration of X indicates how many of the potential buyers of X are reached. The brand share amongst brand buyers describes the loyalty of the brand buyers to the brand and the intensity factor is a measure, whether the X-buyers are more or less intensive product groups buyers than an average product group buyer. The formula says

that a product gains a high market share if it reaches a high percentage of the potential buyers of this product, if the buyers are loyal to the product and buy intensively in the product group.

Especially in brand evaluation the strength and the weaknesses of brands become evident by comparing these type of characteristics. This means that consumer panel data have its own value in benchmarking, even if they are not used for causal or dynamic analyses.

Typically these characteristics are calculated on an aggregated level, but they may serve as a guideline for social research for the construction of *different dependent variables on the individual level*. E.g. the following characteristics can be calculated for each panel member:

- A dummy variable whether the panel member bought in the product group or not, indicating interest in the product group.
- Inside the buyers of the product group: the volume of the product group a panel member bought, indicating the intensity of demands for the product group.
- Inside the buyers of the product group: a dummy variable whether a panel member bought product X, indicating who is interested at all in X.
- Inside the buyers of product X: the share of the product group which is allotted to product X, indicating the loyalty to X.

Instead of only looking to the amount of X bought, one could use the dependent variables above, which indicate different aspects of the buying act. Probably one will detect, that different causal factors are relevant on the different levels.

3.2 Special Analyses about the Dynamics of Purchasing Behavior

At least a short impression should be given about special analyses of consumer panel data which refer to the dynamic aspect of panel data. Typically two time periods or the buying acts before and after the purchase of a certain product are compared.

Without describing the established dynamic analyses (brand switching, gain and loss, etc.) in detail two examples may give an impression what usually is analysed.

Example 1: A retail company A does not offer a certain brand Y any more. What will the purchasers do, which previously bought brand Y in A? How many of them stay in the shops of A, but buy a competitive product of Y? How many of them go to another shop and are loyal to Y? And what are the effects on the value share of Y? These questions can be answered by comparing the purchases of the buyers which bought Y in A before and after the policy change of A.

Example 2: A manufacturer recognizes, that his Brand Z loses market share. That means that purchasers of Z switch to other brands (loss of purchasers) or that they buy at least other brands in higher proportions than before (sinking loyalty). So the question is: Which other brands gain how much by the losses of Z. A „gain and loss“ analysis answers these questions by comparing two time slices.

It is also possible to create variables on the household level which describe the dynamics of purchasing behavior (e.g. brand switching) and analyse them (e.g. with survival analysis).

4. The Data Delivered

The GfK sold an extensive data set to ZUMA under the following restrictions:

- Characteristics which allow to identify brands and manufacturers were removed from the data
- Characteristics which allow the identification of shops were removed from the data

In doing this GfK fulfills it's obligations against it's clients not to allow others an evaluation of brands, manufacturers or retail companies.

The data are *household panel data from 1995* (at this time: paper & pencil diary). In this year the total sample was divided into two subsamples of same size and same structure. Data for the product groups partly were collected in both panels or only in one of the two subsamples, so that depending on the product group the sample size differs.

In total the structural data and the purchase data of 9064 households were delivered, which reported at least the whole year of 1995 continuously. These data stem from the unadjusted sample, which is disproportional in household size and will have other disproportionalities, because panel mortality is not random (e.g. it is higher for young people). Before making projections to all German households an adjustment is necessary.

The *household characteristics and attitude data* are organised in a way, that for each household a data record containing the informations in a fixed format was produced.

The household informations cover:

- Region
- Townsize
- Size of the houshold
- Number of children below 14 years in the household
- Age of the housekeeping person

- Net income of the household
- And other informations about profession, housing conditions, equipment with household appliances, etc.

The attitude data cover the answers on 74 items of the areas of life style, eating habits and environmental consciousness. Also the scales constructed from these items and the results of cluster analyses of the households on the base of the scales were delivered.

In total the *purchases* of 81 product groups are reported. 36 are covered in both panels, the others in one of the two subsamples. The purchase data are organized in a flat file containing one record per household per buying act of a certain product. The contents of the purchase records are especially:

- The household number, which allows to connect the purchase data with the household characteristics
- The date of the purchase
- The type of shop where the product was bought
- A product description consisting of a product group number, product type and several product group dependent features like type of packaging, kind of product etc.
- The number of items bought from the same article (at this day in the same shop)
- The cumulated volume of these items in grams, milliliter or pieces.
- The cumulated value of these items in Pfennigen (0,01 DM).

When analysing the data, please be careful with the following issues:

- Package size can be calculated by dividing volume by nr. of items bought.
- Price per package is calculated as value divided by nr. of items bought.
- Price per unit is calculated as value divided by volume.
- Because volume units are measured in different units depending on the product group, it is recommended to use value, when combining several product groups.
- Inside some product groups also different units may be used, e.g. milliliter for fluids, grams for powder, pieces for tabs.

Two ways of data organisation may help to analyse the data with standard tools. One is to load household structures and purchase data into two database tables and relate them by the household number. The other is to add the household information to each purchase data record.

Since ZUMA showed interest in analysing the effects of changes in household structures and attitudes on purchasing behavior, also the household characteristics and the attitude measures of 1994 and 1996 were delivered as far as they were enquired. The household characteristics and the attitude questions are updated once a year, so the exact date when a change in these features happened cannot be detected.

5. Final Comments

How far these data may lead to interesting insights for social science and vice versa, how far GfK gains knowledge from the analyses of the data cannot be finally settled at the moment. The hope of GfK is, that new methods of analysing this type of data may emerge from this cooperation. Some subjective remarks may conclude these notes:

- Purchasing behavior is a central part of peoples everyday-life and also a central part of our economic system. It's worthwhile to analyse it.
- Consumer panel data are the best information about consumer behavior available at the present. Behavior is recorded as close to it's occurrence as possible.
- The dynamic character of panel data delivers interesting material – even when the type of behavior does not interest the analyst – for developing models of analysing these type of data.
- The data may help to test hypotheses about social behavior as far as the interesting variables are operationalised.

The first results are contained in this publication. It's a start to interchange ideas and data for intensifying public private partnership.

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